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HOYA R. BR. (ASCLEPIADACEAE) IN AUSTRALIA – AN ALTERNATIVE CLASSIFICATION

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Summary

An alternative classification to that of Hill, of the species of *Hoya* R. Br. in Australia excluding the *H. australis* R. Br. ex Traill complex is given. Six species are described and illustrated with notes on variation, distribution, habitat and conservation status. *H. lauterbachii* Schumann is a widely distributed species in far north Cape York Peninsula, Queensland and in Papuasia. Flower shape and colour of *H. lauterbachii* varies considerably. *H. gigas* Schltr. and *H. coronaria* var. *papuana* Bailey are placed in synonymy with *H. lauterbachii*. *H. alata* K. Hill is reduced to synonymy with *H. pseudolittoralis* Hemsley. Variation in *H. macgillivrayi* Bailey and *H. nicholsoniae* F. Muell. is described. *H. litoralis* Schltr. is recorded for Australia. *H. serpens* J.D. Hook. is naturalised at one locality. A key to the species of *Hoya* recognised for Australia is given.

Introduction

The genus *Hoya* R. Br. was first validly published in Brown (1810a) and not in Brown (1810b) as listed in Farr *et al.* (1979). Brown (1810b) was issued as a preprint of Brown (1811) and was intended to be simultaneously published with Brown (1810a), but the Prodromus predates the preprint by some seven days (Mabberley 1985). Brown (1810b, 1811) unequivocally designated as type of his genus *Hoya* the species *H. carnosa* based upon *Asclepias carnosa* L.f.

Species of *Hoya* are widely distributed in the Indian subcontinent, China, south-east Asia, Malesia, New Guinea, Australia and some Pacific Island groups. Major centres of diversity for the genus would appear to be present in the Philippines and New Guinea. Rintz (1978) outlined in detail morphological variation in *Hoya* and this has been largely reiterated by Hill (1988) who also allocated the Australian taxa to the sections mainly formalised by Schlechter (1914). In the present paper we have not included the species in sections as we believe that an infrageneric classification is premature given the chaotic state of the majority of *Hoya* taxonomy.

The first species to be recorded for Australia was *H. carnosa* (Brown 1810a,b), although the Australian material seen by Brown was not conspecific with the type of this species which comes from China and Taiwan. This Australian material was subsequently described as *H. australis* R. Br. ex Traill by Traill (1830). Subsequent taxa with types based on Australian material were described by Mueller (1860, 1866), Bailey (1884, 1897, 1914) and Hill (1988). Considerable overlap in species of *Hoya* occurs between Australia and New Guinea and the last account of the genus in New Guinea is that of Schlechter (1914).

Taxonomy of the genus presents some difficulties because of the wide variation within and between species that we consider has not been satisfactorily addressed in the most recent work on the Australian taxa (Hill 1988). *H. australis* presents a taxonomic challenge because of its extensive range and variation. We believe that the variation within the *H. australis* group (incorporating *H. australis*, *H. keysii* Bailey, *H. dalrympleana* F. Muell., *H. sanae* Bailey ('*sana*'), *H. rupicola* K. Hill, *H. oligotricha* K. Hill and *H. oligotricha* subsp. *tenuipes* K. Hill) is best recognised with subspecific taxa as the variation is mainly vegetative with all the designated taxa having similar floral morphology. The variation in and classification of the *H. australis* complex in Australia will be addressed in a multivariate study in a separate publication (Forster & Liddle, unpubl. data).

Materials and Methods

Field collections have been made over a 10 year period and all taxa with the exception of *H. serpens* and *H. litoralis* have been examined in the field. All taxa have been grown in cultivation at Mareeba.

Descriptions have been prepared from live plants or spirit preserved material (indicated * in specimen citations). Herbarium holdings at AD, BRI, CANB (Australia only), DNA, JCT, MEL (New Guinea only), NE, PERTH and QRS and selected type material from A, B, BM and K have been examined. It was not possible to obtain herbarium holdings of *Hoya* from NSW and isotype material for *H. alata* K. Hill described by Hill (1988) has not been received at BRI as of February 1990. Duplicates listed for other herbaria in the NGF (New Guinea Forestry) series distributed by LAE have not been seen. An index to all numbered collections seen is given at the end of the paper to enable curation of the extensive NGF series.

Taxonomic Treatment

Hoya R. Br., Prodr. 459 (1810). **Type:** *Asclepias carnosa* L.f. (= *Hoya carnosa* (L.f.) R. Br.).
R. Br., Asclepiadeae 15 (1810); Mem. Wern. Nat. Hist. Soc. 1: 26–27 (1811); Wight, Contrib. bot. India 35–39 (1834); Endl., Gen. pl. 595–596 (1838); Decne. in DC., Prodr. 8: 634–639 (1844); Blume, Rumphia 4: 29 (1849); Benth., Fl. austral. 4: 346–347 (1869); Benth. in Benth. & J.D. Hook, Gen. pl. 2: 776–777 (1876); J.D. Hook., Fl. Brit. India 4: 53–62 (1885); Schumann in Engl. & Prantl., Nat. Pflanzenfam. 4(2): 289–291 (1897); Bailey, Queensl. fl. 3: 1012–1013 (1900); Schumann & Lauterb., Fl. Schutzgeb. Südsee 512–514 (1901); Schltr., Nachträge Fl. Schutzgeb. Südsee 362–367 (1905); Bot. Jahrb. Syst. 50: 104–138 (1914); Merrill, Enum. Philipp. fl. pl. 351–354 (1923); Ridley, Fl. Malay Peninsula 2: 393–402 (1923); Tsiang, Sunyatsenia 3: 169–180 (1936); Sunyatsenia 4: 124–126 (1939); Bakhuizen van den Brink, Blumea 6: 378–381 (1950); Backer & Bakhuizen van den Brink, Fl. Java 2: 266–271 (1965); Tsiang & Li, Act. Phytotax. Sin. 12: 120–127 (1974); Rintz, Malay. Nat. J. 30: 467–522 (1978); Lu & Kao, Fl. Taiwan 4: 238 (1981); Ali, Fl. Pakistan 150: 38 (1983); Huber, Rev. Handbk. Fl. Ceylon 4: 109–111 (1983); Liddle, Hoya in Australia 1–34 (1986); Hill, Telopea 3: 241–255 (1988).

Sperlingia Vahl, Skr. Natur. hist. Selsk. 6: 112 (1810). **Type:** *S. verticillata* Vahl (= *Hoya verticillata* (Vahl) G. Don).

Schollia J.F. Jacq., Eclog. Pl. Rar. 1: 5, t. 2 (1811). **Type:** *S. crassifolia* J.F. Jacq. (= *Hoya carnosa* (L.f.) R. Br.).

Pterostelma Wight, Contrib. bot. India 39 (1834). **Type:** *P. acuminata* Wight (= *Hoya acuminata* (Wight) Benth.).
Endl., Gen. pl. 596 (1838); Decne. in DC., Prodr. 8: 633 (1844).

Physostelma Wight, Contrib. bot. India 39 (1834). **Type:** *P. wallichii* Wight (= *Hoya campanulata* Blume).
Endl., Gen. pl. 596 (1838); Decne. in DC., Prodr. 8: 633 (1844); Benth. in Benth. & J.D. Hook, Gen. pl. 2: 777 (1876); J.D. Hook., Fl. Brit. India 4: 62–63 (1885); Schumann in Engl. & Prantl., Nat. Pflanzenfam. 4(2): 289 (1897); Backer & Bakhuizen van den Brink, Fl. Java 2: 265 (1965).

Cyrtoceras Bennett, Pl. jav. rar. 90, t. 21 (1838). **Type:** *C. reflexum* Bennett, (= *Hoya multiflora* Blume).

Centrostemma Decne., Ann. Sci. Nat. (Paris) ser. 2(9): 271, t. 12 (1838). **Type:** *C. multiflorum* (Blume) Decne. (= *Hoya multiflora* Blume).
Decne. in DC., Prodr. 8: 634 (1844); Tsiang, Sunyatsenia 3: 168 (1936); Sunyatsenia 4: 124 (1939).

Cystidianthus Hassk. in Hoev. & de Vriese, Tijdschr. Natuurl. Gesch. Physiol. 10: 125 (1843). **Type:** *C. campanulatus* (Blume) Hassk. (= *Hoya campanulata* Blume).

Plocostemma Blume, Mus. bot. 1: 59 (1849). **Type:** not designated.

Acanthostemma Blume, Mus. bot. 1: 57 (1849). **Type:** not designated.

Cathetostemma Blume, Mus. bot. 1: 59 (1849). **Type:** *C. laurifolium* (Decne.) Blume (= *Hoya laurifolia* Decne.).

Otostemma Blume, Mus. bot. 1: 59, t. 11 (1850). **Type:** *O. lacunosum* (Blume) Blume (= *Hoya lacunosa* Blume).

Vines or shrubs, usually twining, with white or occasionally clear latex, terrestrial, epiphytic or lithophytic. Stems slender, rarely becoming corky. Roots fibrous, nodal or intranodal. Leaves opposite when mature, alternate on seedlings, coriaceous, fleshy or rarely succulent, elliptic, ovate, rhomboid, narrowly lanceolate or lanceolate, primary venation pinnate or palmate; margins entire, glabrous or with indumentum, with or without glands at the base of the lamina. Inflorescence pseudomonochasial with the cymes appearing at nodes between the pairs of leaves, becoming racemiform with age and producing flowers for several seasons in most species; cymes 1–many-flowered. Calyx 5-parted; lobes triangular, ovate-oblong, acute, generally with glands at base. Corolla white, pinkish white, green, yellow, red or pink; deeply 5-lobed, rotate or campanulate, fleshy or waxy; lobes membranous, fleshy, valvate in bud, margins often recurved, generally glabrous without, often papillose or with short indumentum within. Staminal corona single, consisting of 5 large, fleshy, horizontally spreading lobes attached to the staminal column; each lobe with parallel, inrolled keels. Anthers with short incurved terminal appendage. Pollinaria comprising 2 pollinia; pollinia smooth, erect, 1 in each anther cell, oblong to ovate-oblong, with or without a pellucid margin; corpusculum oblong; caudicles winged or unwinged for part or whole length. Gynostegium conical with obtuse style-head generally enclosed by stamens; ovaries free, glabrous. Follicles fusiform or terete-ovoid, smooth or roughened, rarely paired. Seeds flat, ovate, brown, comose at micropylar end.

Hoya contains over 100 species, with seven in Australia.

Key to the species of *Hoya* in Australia

1. Flowers more than 3.0 cm diameter 2
   Flowers less than 3.0 cm diameter 3

2. Coronal lobes 3–4.5 mm long, pollinia lacking a pellucid margin . . . . . **1. H. lauterbachii**
   Coronal lobes 10–12 mm long, pollinia with a pellucid margin . . . . . **2. H. macgillivrayi**

3. Venation acrodromous, leaves distinctly 3-veined above . . . . **3. H. nicholsoniae**
   Venation not distinctly acrodromous, leaves not distinctly 3-veined above 4

4. Pedicels equal, venation pinnate . . . . . **H. australis** complex
   Pedicels unequal, venation obscurely subparallel 5

5. Petals strongly reflexed, outer tip of corona lobe divided . . . . . **4. H. litoralis**
   Petals not strongly reflexed, outer tip of corona lobe not divided 6

6. Leaf surface smooth; flowers 7–8 mm diameter . . . . . **5. H. pseudolittoralis**
   Leaf surface papillose; flowers 15–16 mm diameter . . . . . **6. H. serpens**

1. **Hoya lauterbachii** Schumann, Monatsschr. Kakt.-Kunde. 6(1): 7–8 (1896). **Type:** Nordöstl. Neu-Guinea: im Walde am Mittellauf des Gogol-Flusses, 10 November 1890, *C. Lauterbach* 930 (holo: B†).
Schltr., Bot. Jahrb. Syst. 50: 136 (1914); Forster & Liddle in Williams, Native Pl. Queensl. 4: 230 (1990).

Hoya coronaria var. *papuana* Bailey, Queensl. Agric. J. 3: 156 (1898), **synon. nov. Type:** Foot of Mt Trafalgar, New Guinea, undated, *F.M. Bailey* (holo: BRI[AQ360787]).

Hoya gigas Schltr., Bot. Jahrb. Syst. 50: 136 (1914). **synon. nov. Type:** Nordöstl. Neu-Guinea: auf Bäumen in den Wäldern auf dem Gomadjidji, am Waria, *ca* 450 m u. M., May 1909, *Schlechter* 19389 (holo: B (photo!)).
Schltr., Asclep. German New Guinea, III. Hoya R. Br. (Engl. Transl.) 33 (1981); Burton, Hoyan 5: 46–48 (1983).

Hoya sp., Liddle, Hoya in Australia 26, 28–33 (1986); Jones & Gray, Climbing Pl. Austral. 237, 252 (1988).

[*Hoya rubida* auct. non Schltr.; Jones & Gray, Austral. Climbing Pl. 126–127 (1977)].

Perennial vine, with white latex. Stems twining, cylindrical, to 5 mm diameter, with indumentum of uniseriate hairs or hispid with stiff black bristles; internodes variable in length to 8 cm. Leaves petiolate; lamina ovate to oblong, up to 13 cm long and 7.5 cm wide, with up to 6 brochidromous anastomosing lateral veins, base cordate to sharply truncate, apex mucronulate, upper surface minutely and sparsely puberulous to glabrous, yellowish green, light green or dark green, under surface densely puberulous to glabrous, paler than upper; petiole 1–4 mm long, 3–4 mm wide, with dense indumentum; extrafloral nectaries 2 at the junction of the petiole and lamina. Inflorescence with 1–8 flowers; peduncle to 4.5 cm long, 4–6 mm diameter, with dense indumentum, green. Flowers 3.5–5.5 cm diameter; pedicels 2–3.5 cm long, 2–3 mm diameter, with sparse to dense indumentum, green. Sepals lanceolate-ovate to ovate, 5–7 mm long, 2–4 mm wide, with 1 gland at each sinus. Corolla campanulate, minutely puberulous with white hairs or glabrous with a shiny appearance; deep red, red, brown, pink, yellow, yellow with pink longitudinal streaks alternating with corona, or cream; lobes reflexed, inflexed or horizontal, 8–15 mm long, 12–17 mm wide, tips acute. Corona inserted on top 3 mm of staminal column, 0.8–1.5 cm diameter; lobes ovate, broadly acute at tip, 4–5 mm long, 2.5–4 mm wide, variously coloured as with corolla, but generally yellow with edges of a different colour. Staminal column sunken into corolla base for 1–2 mm or not sunken at all, 6–7 mm long, 6–7 mm diameter. Anther membranes acute, 1.3–1.5 mm long, 1.4–1.5 mm wide. Slit between anther wings 1.5–2 mm long. Style-head not exceeding anthers, c. 2 mm diameter. Ovaries free, glabrous, c. 4 mm long and 3 mm wide. Pollinaria 1–1.3 mm long, 1.2–2 mm wide; pollinia horizontal to erect, without pellucid margin, 0.7–0.75 mm long, 0.3–0.35 mm wide; corpusculum 0.7–0.8 mm long, truncate at top and 0.4–0.45 mm wide, tapering to c. 0.2 mm wide at bottom; caudicles geniculate in middle, segment nearest to corpusculum winged, 0.5–0.7 mm long, 0.2 mm wide, segment nearest to pollinia not winged, c. 0.3 mm long and 0.05 mm wide. Follicles 14–16 cm long and 3 cm diameter. Seed oblong, light-tan, 7–8 mm long, 2–3 mm wide; coma 18–20 mm long, white. **Figs 1 & 2.**

Selected Specimens (21/79): **Indonesia. Irian Jaya.** Tabati, Jautefa Bay, Jun 1938, *Brass* 8847 (BRI; A *n.v.*). **Papua New Guinea.** West Sepik District: Meinat flood plain N slopes Bewani Mts, 11 km SSW of Bewani, 3°08′S, 141°08′E, *Wiakabu et al.* NGF50603 (BRI; L,LAE *n.v.*). Western District: 9 miles [15 km] from Kopiago on Korobe Road, 5°22′S, 142°33′E, Nov 1968, *Womersley, Vandenberg & Galore* NGF37343 (BRI; L,LAE *n.v.*). New Britain: Upper Johanna River, in foothills of Whiteman Range, Gasmata, 5°55′S, 150°05′E, Mar 1966, *Frodin* NGF26510 (BRI; A,CANB,K,L,LAE *n.v.*). Madang District: Aiome, 5°05′S, 144°05′E, Mar 1968, *Katik* NGF32774 (BRI; A,BISH,BO,BM,CANB,K,L,LAE,NSW,PNH,SING,US *n.v.*). Bougainville: Arawa Plantation, 6°15′S, 155°40′E, Apr 1970, *Millar & Vandenberg* NGF48509 (BRI; CANB,L,LAE *n.v.*). Morobe District: Watut Road, Golden Pines, 7°10′S, 146°37′E, Mar 1967, *Streimann & Kairo* NGF35649 (BRI; A,BO,CANB,K,L,LAE,NSW,SING *n.v.*); Lasanga Is, 7°25′S, 149°15′E, Nov 1969, *Streimann* NGF44288 (BRI; A,BO,CANB,K,L,LAE *n.v.*). Gulf District: Kaintiba – Bema Road, 4 km N of Kaintiba, 7°29′S, 146°00′E, Jan 1983, *Kairo* 589 (BRI; A,BFC, CBG,K,L,LAE,QRS,UPNG *n.v.*). Central District: Tapini area, 8°18′S, 146°48′E, May 1971, *Lelean* NGF46375 (BRI; CANB,L,LAE *n.v.*). Northern District: South of Biniguni Village, 9°40′S, 149°10′E, Jun 1972, *Womersley & Katik* NGF43983 (BRI; L,LAE *n.v.*). Milne Bay District: Fife Bay, Oct 1930, *Turner* 55 & 56 (BRI). **Solomon Islands.** Njapuana Is, Sep 1945, *Walker & White* BSIP141 (BRI). **Australia. Queensland.** Cook District: Punsand Bay, 10°44′S, 142°27′E, *Liddle* IML177 (BRI*); Bamaga, 10°44′S, 142°28′E, *Liddle* IML175, 176 (BRI*); Hann Ck, *Lavarack* IML529 (BRI*); Mt Tozer, *Liddle* IML281 (BRI*); 10 miles [16.7 km] NE of Iron Range, Apr 1944, *Flecker* [AQ216598] (BRI); Lamond Hill, Iron Range, 12°43′S, 143°18′E, Apr 1988, *Forster* 4210–4213, 4215–4221 & *Liddle* (BRI*); Garraway Ck Rockpiles, 12°45′S, 143°11′E, Apr 1988, *Forster* 4236, 4241 & *Liddle*

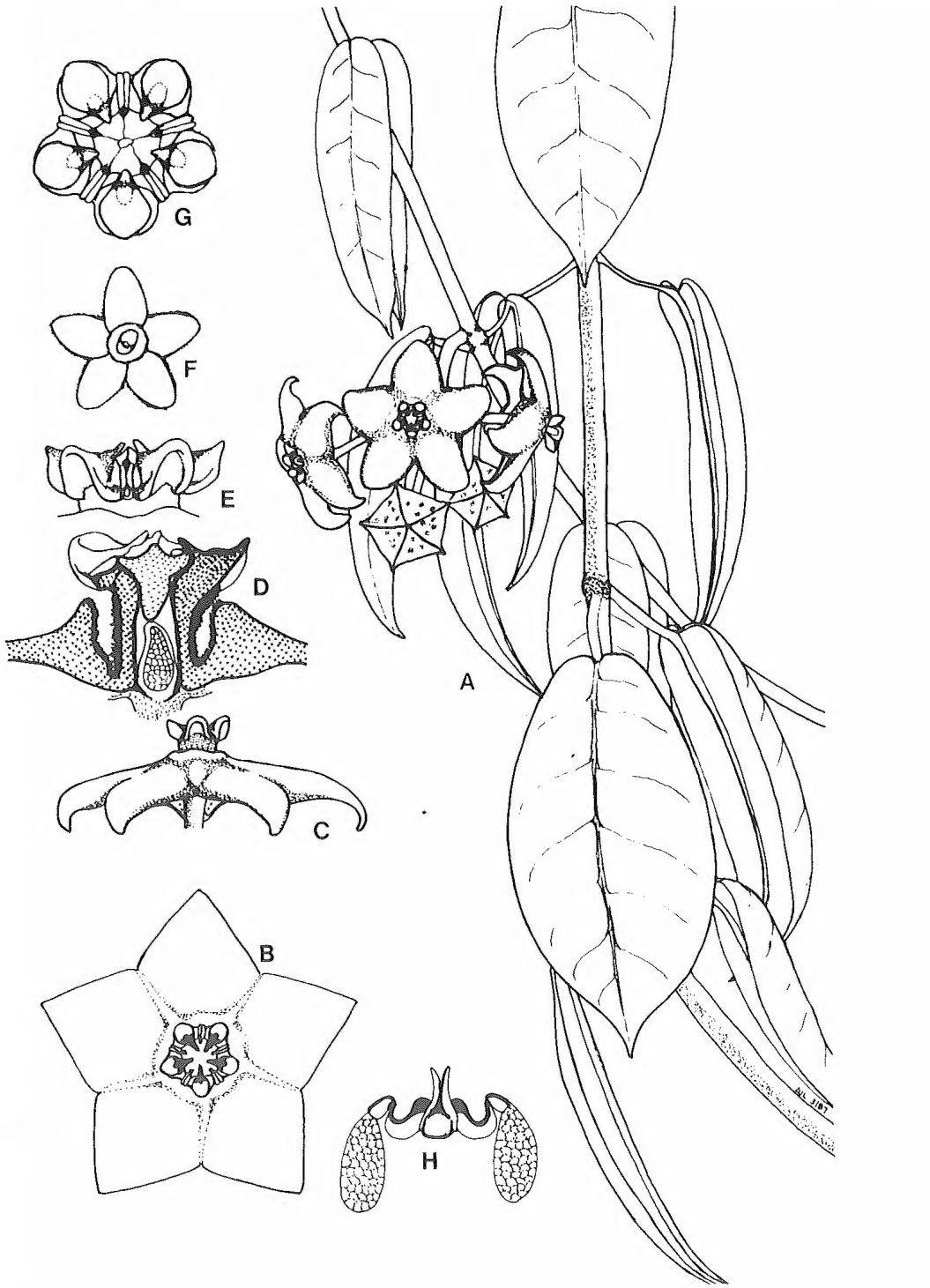

Fig. 1. *Hoya lauterbachii*: A. habit of flowering plant × 0.5. B. apical view of flower × 1. C. lateral view of flower demonstrating the reflexed nature of the corolla and the exserted nature of the staminal column and staminal corona × 1. D. lateral T.S. of staminal column and staminal corona × 2.5. E. lateral view of staminal corona × 2.5. F. apical view of calyx and ovaries × 2.5. G. apical view of staminal column × 2.5 H. pollinarium × 16. All from live material of Lavarack IML529.

(BRI*); McIlwraith Range, 13°53'S, 143°17'E, Apr 1979, *Liddle* IML10 (BRI*); Massey Ck, Oct 1986, *Gray* 4370 (QRS).

Distribution and habitat: *H. lauterbachii* is widely distributed in New Guinea and islands such as Bougainville. In Australia, this species is restricted to the rainforest communities near Bamaga, the Iron and McIlwraith Ranges and Glennie tableland (**Map 1**). *H. lauterbachii* occurs in a variety of rainforest types including microphyll and notophyll deciduous vine thickets, notophyll vine forest and mesophyll palm vine forests. Plants may be epiphytic or lithophytic. Parent rock types are variable, but primarily volcanics with granites and basalts represented. Collections have been recorded from near sealevel to 200–300 m in Australia and up to 1000 m in Papua New Guinea. In Australia, *H. lauterbachii* may grow in association with *H. nicholsoniae*, *H. pseudolittoralis*, *H. australis* subsp. *sanae* (Bailey) K. Hill and the taxon named as *H. oligotricha* subsp. *tenuipes* K. Hill.

Notes: This species has remained somewhat of an enigma, in so much as the name has not been applied either to plants in cultivation or in herbarium collections. It has long been recognised that a species of *Hoya* belonging to the Section *Eriostemma* existed in far north Cape York Peninsula, Queensland, with apparently the first collection being made by Hugo Flecker in 1944. Plants of this taxon have been misidentified in the past as *H. rubida* Schltr. (Jones & Gray 1977) a taxon which is not closely related to *H. lauterbachii*. Hill (1988) omitted *H. lauterbachii* entirely. However it could be the taxon referred to on page 241 of his account:

> "One group of taxa, represented in Australia by a single undescribed species, differs markedly in a range of key diagnostic characters from *Hoya s. str.* A study of *Hoya* and related genera had led to the removal of this group to a new genus (*Eriostemma* (Schltr.) K. Hill, Hill in prep.)."

After examination of the type sheet of *H. gigas* and accompanying sketches by Schlechter, and the illustration of *H. lauterbachii*, we believe that the taxon that occurs in Australia and commonly in Papua New Guinea is *H. lauterbachii*. *H. lauterbachii* was probably described from cultivated material which undoubtedly provided the material drawn in the illustration accompanying the original description. *H. gigas* Schltr. was described and illustrated by Schlechter (1914), based on material he collected in what was then German New Guinea (now Papua New Guinea). Schlechter placed his new species in the Section *Eriostemma* and allied it to *H. lauterbachii*, but considered it to differ in the shape of the corolla and the degree of development of indumentum present around the base of the staminal column.

Bailey (1898) described *Hoya coronaria* var. *papuana* Bailey from Papua New Guinea, distinguishing his variety from *H. coronaria* by "The flowers seem very near *H. coronaria* Blume, but without the scattered purple dots on the flowers of that species." Examination of the type of this name revealed that it is identical with *H. lauterbachii*.

Another yet earlier name that could perhaps be applied to this taxon, is *H. neoguineensis* Engl. We have not seen any type material (presumably at Berlin and destroyed) and the original description is not sufficiently detailed to unequivocally place the name with the species considered here.

H. lauterbachii is a remarkably variable species. Flower colour is highly variable with corolla and corona colours ranging from deep red, to various shades of pink, yellow, yellow with pink longitudinal streaks, and cream (two forms are shown in Forster & Liddle 1990). Flower colour varies with respect to conditions of growth, as the same clone may produce flowers of a different colour in different growing seasons.

The relative position of the staminal column and corona in relation to the corolla is also very variable with the staminal column being well exserted from the corolla in some clones (in association with reflexed corolla lobes) or being well sunken into the corolla (Figs 1 & 2, Liddle 1986). Until relatively recently (Liddle 1986), the few clones in cultivation had produced flowers that may be viewed as extremes of this variation range. During April 1988, some ten clones (*Forster* 4210–4213, 4215–4221 & *Liddle*) were collected in flower at Lamond Hill, Iron Range over a distance of c. 100 m. Flower colour of these clones ranged from deep red to yellow-cream. One clone had strongly reflexed corolla lobes, as had been found for material from Punsand Bay and Bamaga,

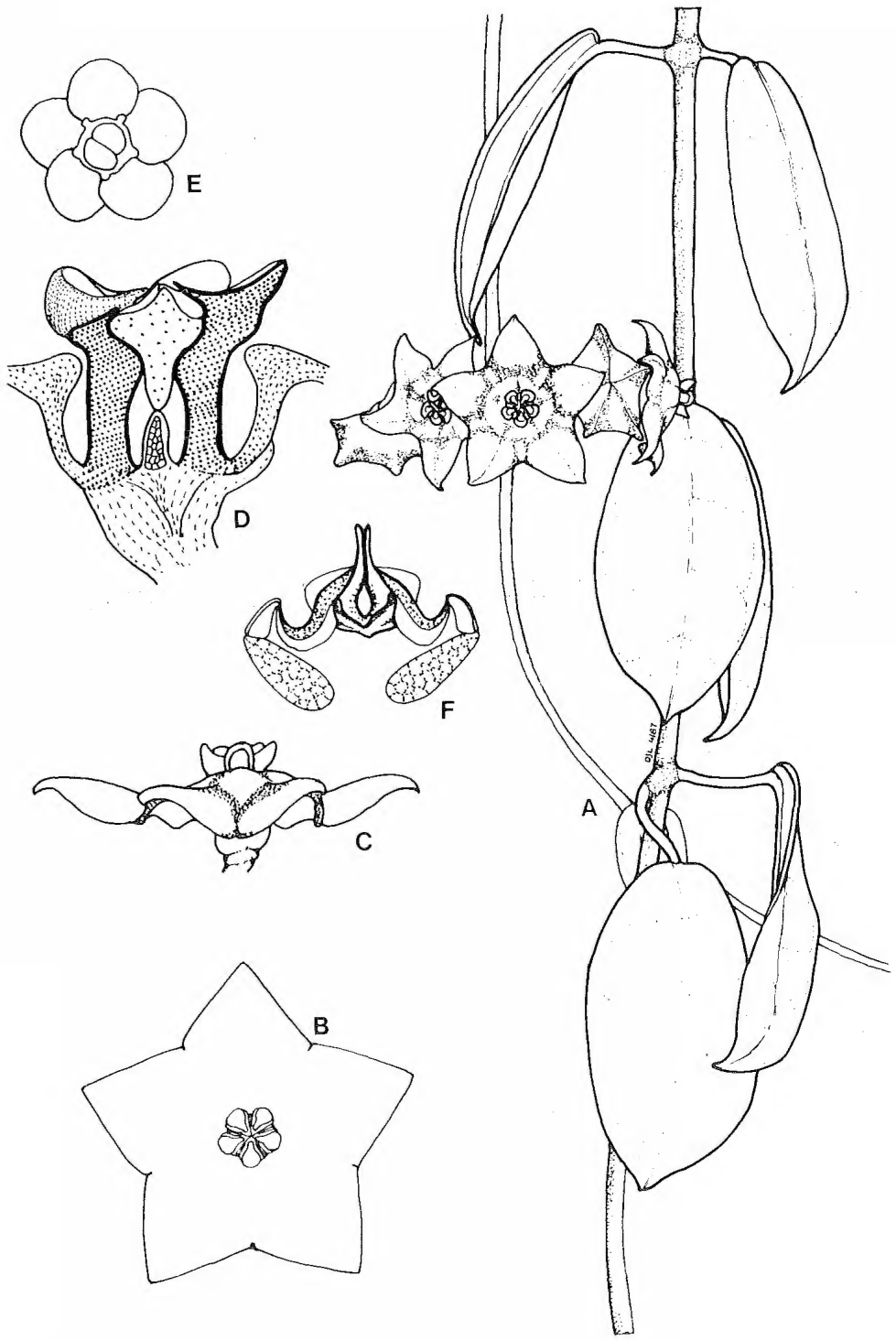

Fig. 2. *Hoya lauterbachii*: A. habit of flowering plant × 0.5. B. apical view of flower × 1. C. lateral view of flower demonstrating the non-reflexed corolla × 1. D. lateral T.S. of staminal column and staminal corona × 2.5. E. apical view of calyx and ovaries, showing glands × 2.5. F. pollinarium × 16. All from live material of Liddle IML176.

but the majority had non-reflexed lobes. The number of flowers in an inflorescence, the leaf shape and pubescence were also highly variable.

Given the many intermediates that exist between the extremes of variation outlined, only one species should be recognised for this material. These observations have obvious implications elsewhere in the genus. Many taxa of *Hoya* are only known from the type collection or relatively few collections in herbaria or cultivation. If the amount of variation that occurs in *H. lauterbachii* is repeated in other species, then it is likely that some of the so called "species complexes" will resolve into "complex species" instead. Furthermore, again due to the variation encountered both within and between different species of *Hoya*, we believe that there are insufficient grounds on which to fragment the genus as proposed by Hill (1988).

Conservation status: *H. lauterbachii* is widespread in far north Queensland and in New Guinea and is not endangered, threatened or rare at present.

2. Hoya macgillivrayi Bailey, Queensl. Agric. J. n.s. 1: 190, Fig. 14 (1914). **Type:** Claudie River, Lloyd Bay, undated, *W. Macgillivray* s.n. (holo: BRI[AQ333104]).
Jones & Gray, Austral. Climbing Pl. Fig. 121 (1977); Silverman, Hoyan 1: 14–16 (1979); Lavarack, Hoyan 5: 3–6 (1983); Williams, Native Pl. Queensl. 2: 160 (1984); Liddle, Hoya in Australia 17, 21–24 (1986); Hill, Telopea 3: 248 (1988); Liddle, Hoyan 10: 2–4 (1988); Jones & Gray, Climbing Pl. Austral. 251 (1988).

Perennial vine, with white latex, epiphytic or rarely lithophytic. Stems twining, cylindrical, up to 5 mm diameter, glabrous; internodes up to 2 cm long. Leaves petiolate; lamina ovate to lanceolate, 15–20 cm long, 2.5–8 cm wide, glabrous, tip acute, base cordate, venation indistinct on both surfaces, midrib prominent, dark green when mature, coppery when juvenile; petiole 2–3.5 cm long, 2–5 mm diameter; extrafloral nectaries 2–5 at join of petiole and lamina base. Inflorescence with up to 12 flowers; peduncle 4–20 cm long, 1–2 mm diameter, glabrous, green to yellowish. Flowers 5.5–8 cm diameter; pedicels 5.4–8.5 cm long, 1.5–2 mm diameter, glabrous, green. Sepals acute, 3–4 mm long, c. 2 mm wide. Corolla campanulate, centre white or entirely dark red; lobes sharply acute with edges extremely recurved, 2–2.5 cm long, 1.9–2.3 cm wide. Staminal corona c. 1 cm long, 1.8–2.4 cm diameter, centre raised above, or flush or sunken below surface of corolla, glabrous; lobes linear, 10–12 mm long, 2–3 mm wide, inner end not acutely raised above outer end, outer end broadly ovate, or inner end acutely raised to at least 0.5 cm above the outer end, and the outer tip of the lobe pointed and sharply raised. Staminal column 8–9 mm long, 3–4 mm diameter. Anther membranes acute, c. 2.5 mm long. Slit between anther wings 3–3.4 mm long. Style-head not exceeding anthers, c. 3 mm diameter. Ovaries glabrous, c. 4 mm long and 2 mm wide. Pollinaria 2–2.2 mm long, 1.1 mm wide. Pollinia oblong, c. 1.4 mm long and 0.45 mm wide; corpusculum 0.77–0.8 mm long, 0.47–0.5 mm wide; caudicles c. 0.4 mm long and 0.2 mm wide. Follicles and seed not seen. **Fig. 3.**

Specimens examined. Queensland. Cook District: Tozers Gap, May 1948, *Brass* 19447 (BRI,CANB; A *n.v.*); ditto, Oct 1986, Gray 4374 (QRS); Puffdelooney Ridge, 12°44′S, 143°12′E, Oct 1980, *Hyland* 10826 (QRS); Iron Range, Jul 1981, *Simmons* 2 & 3 (BRI); T.R. 14, Massey River, *Hodge* IML17 (BRI*); ditto, Nov 1980, *Gray* 1831 (QRS); T.R. 14, Leo Ck road, 13°40′S, 143°20′E, Sep 1972, *Hyland* 6377 (QRS); ditto, Sep 1972, *Hyland* 6378 (BRI); Massey Gorge, 13°49′S, 143°24′E, Sep 1979, *Clarkson* 2618 (BRI); Langkelly Ck, 13°51′S, 143°18′E, Apr 1979, *Liddle* IML15 (BRI*); Coen River, 13°52′S, 143°14′E, Jun 1979, *Liddle* IML16 (BRI*); Rocky River, 13°15′S, 143°25′E, Sep 1973, *Dockrill* 706 (BRI,CANB,QRS); ditto, Oct 1969, *Webb & Tracey* 9428 (BRI).

Distribution and habitat: *H. macgillivrayi* is restricted to the Iron and McIlwraith Ranges (**Map 2**) where it occurs in diverse habitats ranging from notophyll vine forests, deciduous forests and swamps. It may be locally abundant.

Notes: *H. macgillivrayi* is closely allied to *H. archboldiana* Norman and *H. megalaster* Warb. from New Guinea (Liddle 1988). Staminal corona form is variable in the material examined of *H. macgillivrayi* and two very distinct forms are presently in cultivation. The size and colour of individual flowers may also vary both with individual and growing conditions.

Conservation status: As *H. macgillivrayi* is popular in cultivation, there is potentially some pressure on wild populations, particularly in the acquisition of differing coronal and colour forms. As a wide range of material is now in cultivation, this collector

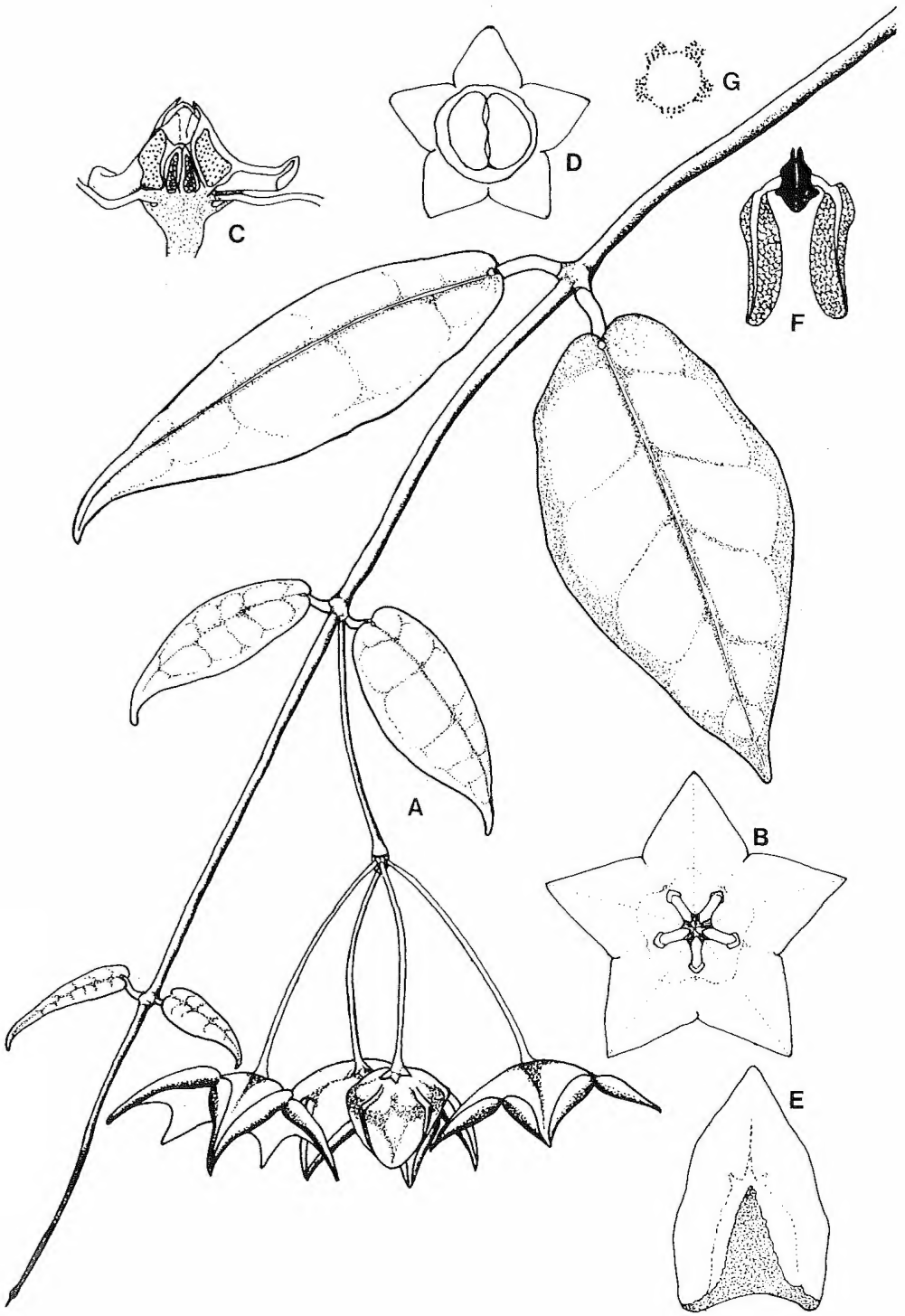

Fig. 3. *Hoya macgillivrayi*: A. habit of flowering plant × 0.5. B. apical view of flower × 0.5. C. lateral view of T.S. of staminal column and staminal corona × 1.5. D. apical view of calyx and ovaries × 3. E. anther membrane × 10. F. pollinarium × 25. G. hairs from around base of staminal corona × 25. All from live material of Liddle IML15.

demand should be satisfied to a large extent. Rating 3RC: Iron Range (Briggs & Leigh 1988).

3. Hoya nicholsoniae F. Muell., Fragm. 5: 159 (1866). **Type:** 'In arboribus ad sinum litoreum Rockingham's Bay. *Dallachy*' (holo: MEL *n.v.*).
F. Muell., Fragm. 9: 71, 190 (1875); Benth., Fl. austral. 4: 347 (1867); Bailey, Syn. Queensl. fl. 319 (1883); Catal. pl. Queensl. 30 (1890); Queensl. fl. 3: 1013 (1900); Comprh. cat. Queensl. pl. t. 311 (1913); Domin, Biblioth. Bot. 89(6): 1086 (1928); Jones & Gray, Austral. Climbing Pl. Fig. 123 (1977); Williams, Native Pl. Queensl. 1: 160 (1979); Liddle, Hoya in Australia 17, 19–20 (1986); Hill, Telopea 3: 248–249 (1988); Jones & Gray, Climbing Pl. Austral. 251 (1988).

Perennial vine, with white latex, epiphytic or lithophytic. Stems twining, glabrous, to 5 mm diameter; internodes variable in length to 20 cm. Leaves petiolate; lamina fleshy to coriaceous, broad-ovate to ovate, 4.5–21 cm long, 4.5–10 cm wide, base cordate, tip acute, broadly pinnately veined, green to purple or brown; petioles 2–3 cm long, 3–8 mm diameter; extrafloral nectaries 4 or 5 or coalesced into a ridge at the junction of the petiole and lamina base. Inflorescence pseudomonochasial with up to 40 flowers; peduncle up to 12 cm long and 2 mm diameter, glabrous, green to purplish. Flower 10–18 mm diameter; pedicels pink to cream, 18–30 mm long, c. 1 mm diameter, glabrous. Sepals triangular, 1.5–3 mm long, c. 2 mm wide. Corolla rotate, generally reflexed, pale yellow, cream, green or flesh pink, minutely puberulent; lobes ovate to lanceolate-ovate, 6–7 mm long, 4.5–6 mm wide. Staminal corona 2–3 mm long, 7–8 mm diameter, inserted on top 2–2.5 mm of staminal column; lobes rhomboid, the outer edge usually pointed but occasionally rounded, ridged longitudinally above, with two longitudinal inrolled keels below, 3–4 mm long, 2–2.5 mm wide, same colours as corolla, or commonly paler. Staminal column c. 2.5 mm long, 4–5 mm diameter. Anther membranes triangular, c. 1 mm long and 1 mm wide. Slit between anther wings c. 1 mm long. Style-head not exceeding anthers, c. 1.5 mm wide. Ovaries glabrous, 1.5–2 mm long, c. 1.5 mm wide. Pollinaria 0.8–0.95 mm long, 0.45–0.5 mm wide; pollinia erect, oblong, pellucid on outer margin, 0.6–0.7 mm long, 0.22–0.25 mm wide; corpusculum oblong, 0.22–0.3 mm long, 0.15–0.16 mm wide; caudicles winged, 0.18–0.2 mm long, 0.07–0.1 mm wide. Follicle fusiform, 8–15 cm long, 7–12 mm diameter. Seed 6–7 mm long, 3–4 mm wide; coma white, 20–25 mm long. **Fig. 4.**

Selected Specimens (21/55). **Papua New Guinea:** MADANG DISTRICT: Miak, Kar Kar Is., 4°40′S, 146°00′E, Aug 1968, *Millar* NGF37696 (BRI; CANB,L,LAE *n.v.*). MOROBE DISTRICT: Valley behind Oregenang Village, *Winters & Higgens* (USDA354239) IML75 (BRI*); Oomsis L.A., 20 miles [33.3 km] from Lae, 6°40′S, 146°45′E, Apr 1963, *Womersley* NGF17619 (BRI; LAE *n.v.*). WEST NEW BRITAIN: 2 miles [3.3 km] W of Lindenhafen Plantation, 6°20′S, 150°20′E, Feb 1971, *Stevens* LAE51138 (BRI; CANB,L,LAE *n.v.*). WESTERN HIGHLANDS DISTRICT: Mt Kum, 19 km S of Mt Hagen, *Winters & Higgens* (USDA354243), IML86 (BRI*). CENTRAL DISTRICT: Itikinumu Hill near Sirunumu Village, Ogotama, *Winters & Higgens* (USDA354246), IML76 (BRI*). MILNE BAY DISTRICT: Fife Bay, *Turner* [AQ217201] (BRI). **Solomon Islands.** Vanikoro, Santa Cruz Group, May 1928, *Kajewski* 546 (BRI; A *n.v.*). **Australia. Queensland.** COOK DISTRICT: Table Range, Dead Horse Ck, 12°55′S, 143°15′E, Oct 1973, *Dockrill* 780 (QRS); T.R. 14 (Leo Ck road, McIlwraith Range), 13°45′S, 143°20′E, Sep 1975, *Hyland* 8396 (BRI,QRS); Chester River, *Liddle* IML363 (BRI*); Bloomfield near Gap Ck, Oct 1981, *Scarth-Johnson* 1200A (BRI); T.R. 176, Shipton L.A., 15°48′S, 145°14′E, Sep 1982, *Hyland* 12052 (QRS); Coopers Ck, 16°10′S, 145°24′E, *Liddle* IML19 (BRI*); Davies Ck, *Liddle* IML42 (BRI*); Topaz, *Liddle* IML365* (BRI); Nth Johnston, *Liddle* IML41 (BRI*); S.F.R. 675, East Mulgrave L.A., 17°05′S, 145°40′E, Nov 1977, *Gray* 777 (QRS); O'Donoghue's cane farm, Mossman (Saltwater Ck), 1982, *Williams* 82164 (BRI). NORTH KENNEDY DISTRICT: N.P.R. 253, Mt Elliot, 19°30′S, 147°00′E, Dec 1977, *Hyland* 9571 (QRS); NW branch of Dryander Ck, Mt Dryander, Apr 1982, *Puttock & Wilson* [UNSW13284] (MEL).

Distribution and habitat: Widespread in the wet tropics of north Queensland and over a wide area of Papua New Guinea (**Map 3**). Plants are usually epiphytic or lithophytic and grow in a wide range of rainforest types from sealevel to over 1000 m.

Notes: Burton (1983) considered that *H. nicholsoniae* is synonymous with *H. pottsii* Traill described from the Philippines, however until a range of material from the Philippines can be examined to confirm this, we have not followed this synonymy. *H. nicholsoniae* is very variable both in leaf size and shape and the colour of the corolla and corona. Hill (1988) describes the pedicels of this species as being 6–10 cm long; this is incorrect. He also considered that *Liddle* IML39 (illustrated by Liddle 1986) from Flaggy Ck, Kuranda (incorrectly cited as IML36) possibly represented an additional taxon related to *H. nicholsoniae*. This particular clone is well within the range of variation for the species and differs only in the rounded outer coronal lobes edges.

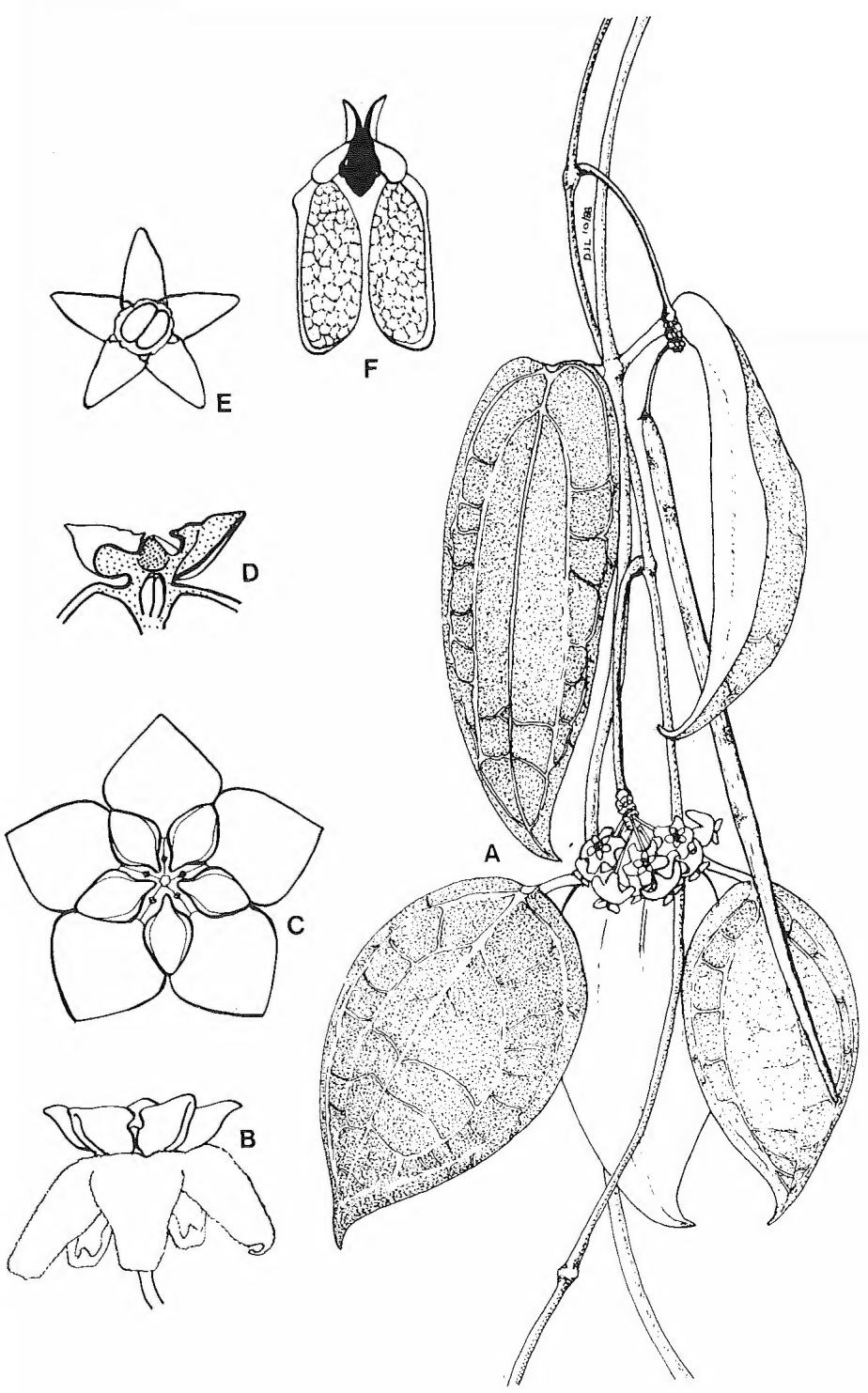

Fig. 4. *Hoya nicholsoniae*: A. habit of flowering and fruiting plant × 0.5. B. lateral view of flower × 2.5. C. apical view of flower × 2.5. D. lateral view of T.S. of staminal column and staminal corona × 2.5. E. apical view of calyx and ovaries, showing glands × 4. F. pollinarium × 28. All from live material of Liddle IML41.

Conservation status: Not endangered, rare or threatened at this stage.

4. Hoya litoralis Schltr. in Schumann & Lauterb., Nachträge Fl. Schutzgeb. Südsee 363 (1905). **Type:** Nordöstl. Neu-Guinea: auf Baumen am Strande von Potsdam-Hafen, 16 October 1901, *Schlechter* 13675 (holo: B (photo!)).
Schltr., Bot. Jahrb. Syst. 50: 108 (1914); Asclep. German New Guinea III. Hoya R. Br. (Engl. transl.) 4 (1981).

Perennial epiphytic vine, with white latex. Stems weakly twining to prostrate, up to 4 mm diameter and with a fine indumentum; internodes variable in length to 11 cm. Leaves petiolate; lamina ovate to broadly lanceolate, succulent, 3–10 cm long, 1.5–3 cm wide, tip acute, base cuneate to rounded, midrib faintly apparent on lower surface, secondary venation obscure, both surfaces with fine indumentum; petiole cylindrical, curved, 6–15 mm long, 1.5 mm diameter; extrafloral nectaries 3 at base of lamina. Inflorescence pseudomonochasial and geotropic, with up to 20 flowers; peduncle up to 7 cm long, 1–2 mm diameter, purple-brown, with fine indumentum. Flower scented, c. 6 mm long, 7–8 mm diameter; pedicels 2–3 cm long, c. 1 mm diameter, mainly glabrous but with an occasional hair, cream with a pink tinge. Sepals acute, c. 1 mm long and 1 mm wide, pale pink, with fine indumentum externally, glands at base absent. Corolla rotate; lobes ovate, pale pink, c. 4 mm long and 4 mm wide, strongly reflexed, upper surface completely covered with a dense covering of uniseriate hairs to 0.5 mm long giving a silver appearance, under surface glabrous. Staminal corona c. 2.5 mm long, 5–7 mm diameter, inserted on the upper 2–2.5 mm of staminal column, light pink; lobes c. 3 mm long and 1 mm wide, top end extended into a subulate tip over the style-head, bottom end with 2 extensions each c. 1 mm long and 0.5 mm wide. Staminal column 2–2.5 mm long, c. 1 mm diameter. Slit between anther wings c. 0.75 mm long. Anther membranes ovate, c. 1 mm long and 0.75 mm wide. Style-head not exceeding anthers, c. 1.5 mm wide. Ovaries glabrous, c. 2 mm long and 2 mm wide. Pollinaria c. 0.6 mm long and 0.5 mm wide; pollinia oblong, outer edge with a pellucid margin, c. 0.4 mm long and 0.17 mm wide; corpusculum oblong, c. 0.15 mm long and 0.1 mm wide; caudicles winged, c. 0.16 mm long and 0.13 mm wide. Follicles and seed not seen. **Fig. 5.**

Specimens examined. Papua New Guinea. WEST SEPIK DISTRICT: Selio Is., 3°10′S, 142°30′E, May 1969, *Millar & Vandenberg* NGF40879 (BRI; CANB,L,LAE *n.v.*). EAST SEPIK DISTRICT: Cape Wom International Park, c. 8 km NW of Wewak town, 3°35′S, 143°35′E, Nov 1976, *Wiakabu & Yefle* LAE70316 (BRI; CANB,L,LAE *n.v.*). WESTERN DISTRICT: Along Tiyangaram (Black River) S of Ambunti, Jun 1966, *Hoogland & Craven* 10280 (BRI; A,CANB,K,L,LAE *n.v.*); ditto, Jun 1966, *Hoogland & Craven* 10337 (BRI; A,CANB,K,L,LAE,US *n.v.*); Lake Daviumbu, Middle Fly River, Aug 1936, *Brass* 7626 (BRI; A *n.v.*). **Australia. Queensland.** COOK DISTRICT: Mt Augustus, Moa Is, 10°09′S, 142°18′E, Nov 1986, *Hardy* IML708 (BRI*); ditto, Feb 1989, *Clarkson* 7767 (BRI*); Moa Peak, Moa Is, Feb 1989, *Clarkson* 7760 (BRI*); Pennefather River, Feb 1987, *Taplin* 223 (BRI).

Distribution and habitat: Recorded from among littoral vegetation from around the coastline of Papua New Guinea, and from two localities in Australia (**Map 2**).

Notes: *H. litoralis* was allied by Schlechter (1905) to *H. gracilis* Schltr. and further collections are required from Papua New Guinea to determine whether or not there is continuous variation between these forms.

Conservation status: *H. litoralis* has been collected in a number of coastal localities in Papua New Guinea, but is rare in Australia. Rating 3R (cf. Briggs & Leigh 1988).

5. Hoya pseudolittoralis Norman, Brittonia 2: 328 (1937). **Type:** Papua New Guinea. WESTERN DISTRICT: Dagwa, Oriomo River, Feb-March 1934, *L.J. Brass* 5990 (holo: BM (photo!); iso: A (photo!), BRI).
Burton, Hoyan 7: 6 (1985).

Hoya alata K. Hill, Telopea 3: 249 (1988), **synon. nov. Type:** Pascoe River rockpile, *B. Wallace* 83250 (holo: NSW *n.v.*; iso: BRI(not received),K,L *n.v.*).

Hoya sp., Jones & Gray, Austral. Climbing Pl. Fig. 126 (1977); Climbing Pl. Austral. (1988).

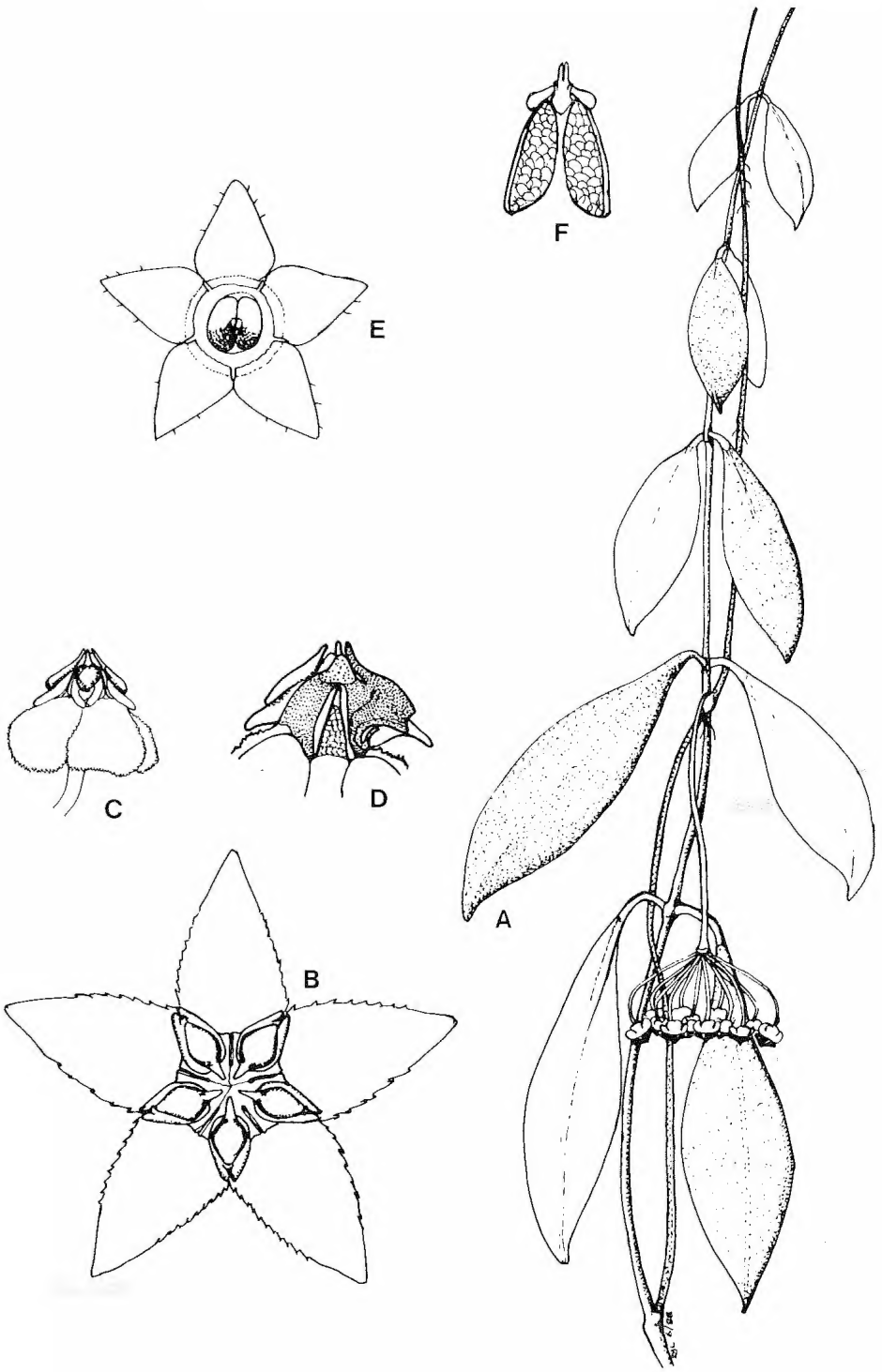

Fig. 5. *Hoya litoralis*: A. habit of flowering plant × 0.5. B. apical view of flower × 4. C. lateral view of flower × 2.5. D. lateral view of T.S. of staminal column and staminal corona × 4. E. apical view of calyx and ovaries × 8. F. pollinarium × 30. All from live material of Hardy IML708.

[*Hoya poolei* auct. non C. White; D. Liddle, Hoya in Australia 13, 15, Fig. 14 (1986)]

[*Hoya gracilipes* auct. non Schltr.; Jones & Gray, Climbing Pl. Austral. 242 (1988); *Thomas & McDonald*, Rare and Threatened Plants of Queensland 18 (1989)]

Perennial epiphytic or lithophytic vine, with white latex. Stems twining, cylindrical, to 5 mm diameter, glabrous or with an occasional scattered hair; internodes variable in length to 7 cm. Leaves petiolate; lamina fleshy, ovate, obovate, or rhomboid, 3–9.5 cm long, 2–5 cm wide, tip acute, base cordate, venation obscure, sub-parallel or palmate, pale green to pink or bronze in strong light; petioles 2–12 mm long, 2–4 mm diameter, glabrous; extrafloral nectaries 4 comprising 2 fused and 2 minor ones at the base of the lamina. Inflorescence pseudomonochasial with up to 12 flowers; peduncle up to 8.5 cm long, c. 2 mm diameter, geotropic, glabrous. Flowers 3–4 mm long and 12–13 mm diameter; pedicels glabrous or with an occasional scattered hair, 16–18 mm long, 1 mm diameter. Sepals ovate to triangular, glabrous, 0.75–1.5 mm long, 0.75–1 mm wide, with generally 1 gland at base. Corolla rotate, lobes recurved, triangular, 4–5 mm long, c. 5 mm wide, pilose on the upper surface, pale pink to almost white. Staminal corona inserted on top 2 mm of staminal column, c. 2 mm long, 6–7 mm diameter; lobes oblong-linear, 3 mm long, 1–1.5 mm wide. Staminal column 2–2.5 mm long, c. 2 mm diameter. Anther membranes acute, c. 0.5 mm long and 0.5 mm wide. Slit between anther wings c. 1 mm long. Style-head not exceeding anthers, c. 1 mm diameter. Pollinaria 0.55–0.6 mm long, c. 0.3 mm wide; pollinia erect, oblong, outer edge pellucid, 0.35–0.4 mm long, c. 0.15 mm wide; corpusculum oblong, tan, 0.13–0.14 mm long, 0.06–0.1 mm wide; caudicles winged for entire length, 0.1–0.13 mm long, 0.1–0.13 mm wide. Follicle fusiform, 7–14 cm long, 0.7–1.2 cm diameter. Seed not seen. **Fig. 6.**

Specimens examined. Papua New Guinea. BOUGAINVILLE: Arawa Plantation, 6°15′S, 155°40′E, Apr 1970, *Millar & Vandenberg* NGF48510 (BRI; L,LAE *n.v.*). CENTRAL DISTRICT: Sirinumu Dam, Sep 1971, *Millar & Womersley* 1277 (MEL; UPNG *n.v.*); Itikinumu Hill, near Sirunumu Village, Ogotama, *Winters & Higgens* (USDA354247), IML80 (BRI*). WESTERN DISTRICT: Lower Fly River, east bank opposite Sturt Island, Oct 1936, *Brass* 8072 (BRI; A *n.v.*). **Australia. Queensland.** COOK DISTRICT: Claudie river, 12°45′S, 143°20′E, Oct 1973, *Dockrill* 786 (QRS); ditto, Oct 1986, *Gray* 4371 (QRS); ditto, Oct 1980, *Hyland* 10814 (QRS); Tozers Gap, 12°44′S, 143°13′E, Sep 1976, *Gray* IML24 (BRI*).

Distribution and habitat: Restricted to the Mt Tozer and Iron Range area of north Queensland, and from a few scattered localities in Papua New Guinea (**Map 4**). Plants occur as epiphytes or lithophytes in rainforest, usually among rocks.

Notes: *H. pseudolittoralis* is closely allied to *H. eitapensis* Schltr. and *H. microstemma* Schltr. and further studies of variation in this group may show all to be part of one variable taxon. Hill (1988) named the Australian material '*alata*' in the belief that it is the only taxon in Australia with winged caudicles. Both *H. litoralis* and *H. nicholsoniae* also have winged caudicles, although they are sparingly so in the latter species. In *H. lauterbachii*, the caudicles are winged for part of their length. The material of *H. pseudolittoralis* from Papua New Guinea shows virtually no morphological differences from the Australian material (Liddle 1986) and collections have been in general cultivation since the early 1970's, so Hill's contention that the Australian material is endemic is without foundation. The isotype of *H. pseudolittoralis* at BRI is a particularly good match for well grown specimens of the Australian populations.

Conservation Status: Rating 3RC: Iron Range (Briggs & Leigh 1988).

*7. **Hoya serpens** J.D. Hook., Fl. Brit. India 4: 55 (1883). **Type**: Sikkim, Himalaya, *Griffith* (holo: K *n.v.*).

Perennial epiphytic vine with white latex. Stems twining, up to 1 mm diameter, rooting at nodes, cylindrical, with sparse indumentum; internodes up to 3 cm long. Leaves petiolate; lamina suborbicular, papillose on both surfaces, up to 15 mm long and 12 mm wide, green to matt-grey in colour above, paler below, with isolated to sparse indumentum on both surfaces, secondary venation obscure; petiole cylindrical, up to 4 mm long and 1 mm wide; extrafloral nectaries absent from lamina base. Inflorescence geotropic, with up to 8 flowers; peduncle 28–35 mm long, c. 1 mm diameter, with sparse indumentum. Flowers 15–16 mm diameter; pedicels 19–20 mm long, c. 1 mm diameter, glabrous or with isolated hairs. Sepals ovate, 1.4–1.5 mm long and c. 1.5 mm wide, with

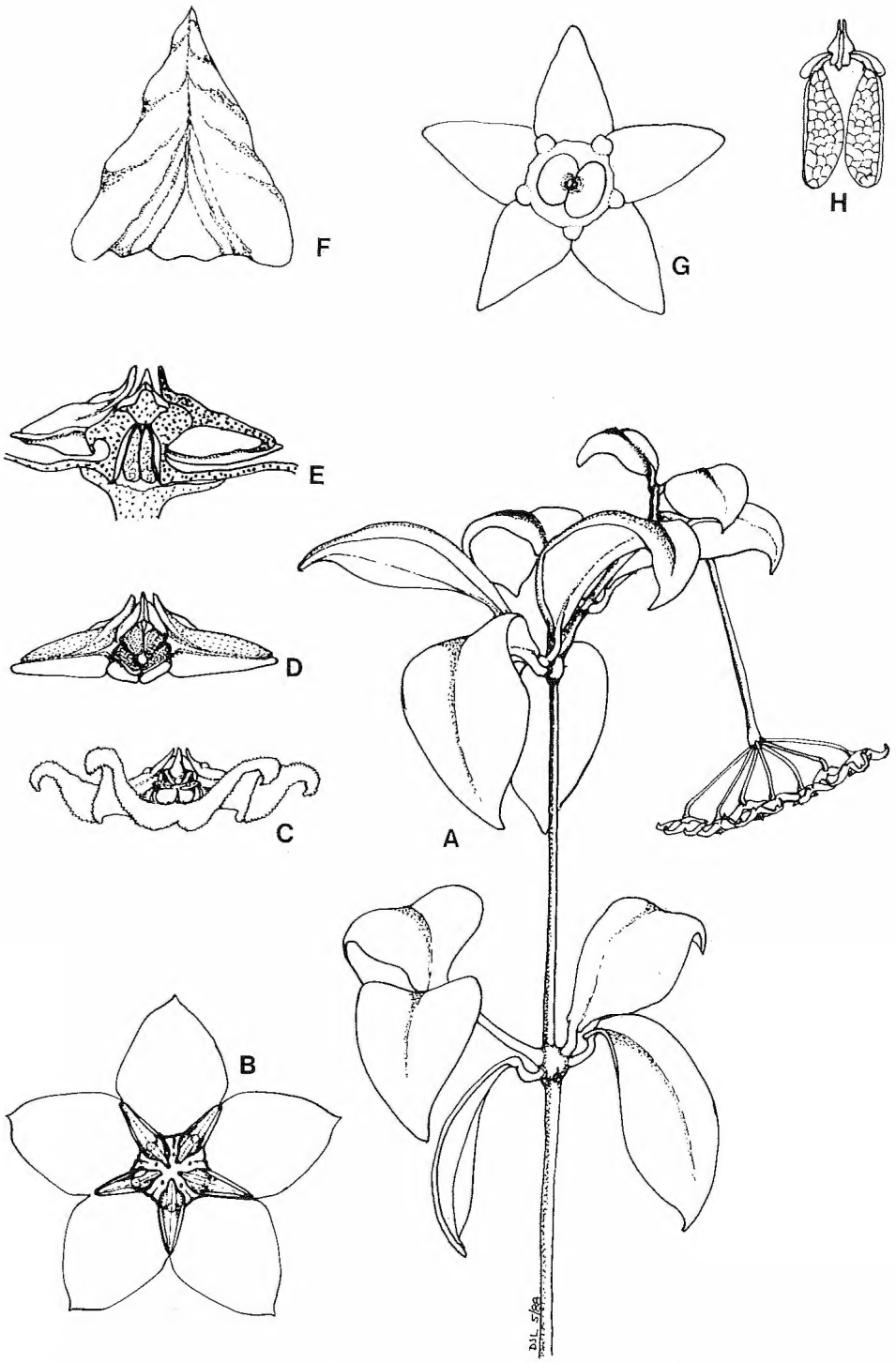

Fig. 6. *Hoya pseudolittoralis*: A. habit of flowering plant × 0.5. B. apical view of flower × 2.5. C. lateral view of flower × 2.5. D. lateral view of staminal column and staminal corona × 4. E. lateral view of T.S. of staminal column and staminal corona × 4. F. anther appendage × 27. G. apical view of calyx and ovaries, showing glands × 4. H. pollinarium × 27. All from live material of Gray IML24.

sparse indumentum externally and 1 gland at each sinus base. Corolla campanulate, white; lobes acute, c. 5 mm long and 5 mm wide, edges recurved, upper surface with dense indumentum of white hairs, under surface glabrous. Staminal corona c. 3 mm long and 7 mm diameter, inserted for entire length of staminal column, white; lobes ellipsoid, ends incurved, 3.3–3.5 mm long and c. 2 mm wide. Staminal column c. 1.5 mm long and 2 mm diameter. Anther membranes triangular, c. 0.5 mm long and 0.5 mm wide. Slit between anther wings 1–1.1 mm long. Style-head not exceeding anthers, c. 1 mm diameter. Ovaries glabrous, c. 1.6 mm long and 1.5 mm wide. Pollinaria c. 0.9 mm long and 0.6 mm wide; pollinia c. 0.7 mm long and 0.26 mm wide, with a pellucid margin; corpuscle 0.34–0.35 mm long, c. 0.16 mm wide, tan; caudicles 0.17–0.18 mm long, c. 0.07 mm wide, slightly winged at pollinium end. Follicles and seed not seen.

Specimens examined. Queensland. Cook District: cultivated ex Lamond Hill, Iron Range, Oct 1985, *Sankowsky & Sankowsky* 473 (BRI*); ditto, Jul 1989, *Sankowsky & Sankowsky* IML274 (BRI).

Distribution and habitat: Recorded only from Lamond Hill where the plants grow as epiphytes in secondary rainforest (G. Sankowsky, pers. comm. 1989).

Notes: The record of this species from Lamond Hill is intriguing as the species is described from the Indian subcontinent. There are many other naturalised plants at Lamond Hill, e.g. *Caladium* × *hortulanum*, *Pedilanthus tithymaloides*, *Sansevieria trifasciata* and *Mangifera indica*, all undoubtedly persisting from the time of the gold-field that was present some 90–100 years ago. As *H. serpens* has not been recorded elsewhere in Australia, New Guinea or south-east Asia, it is considered to be naturalised.

Excluded Species

1. **Hoya barbata** (R. Br.) Sprengel, Syst. veg. 1: 843 (1820), based on *Tylophora barbata* R. Br., Prodr. 460 (1810). This is *T. barbata.*

2. **Hoya flexuosa** (R. Br.) Sprengel, Syst. veg. 1: 843 (1820), based on *Tylophora flexuosa* R. Br., Prodr. 460 (1810). This is *T. flexuosa.*

3. **Hoya grandiflora** (R. Br.) Sprengel, Syst. veg. 1: 843 (1820), based on *Tylophora grandiflora* R. Br., Prodr. 460 (1810). This is *T. grandiflora.*

4. **Hoya paniculata** (R. Br.) Sprengel, Syst. veg. 1: 843 (1820), based on *Tylophora paniculata* R. Br., Prodr. 460 (1810). This is *T. paniculata.*

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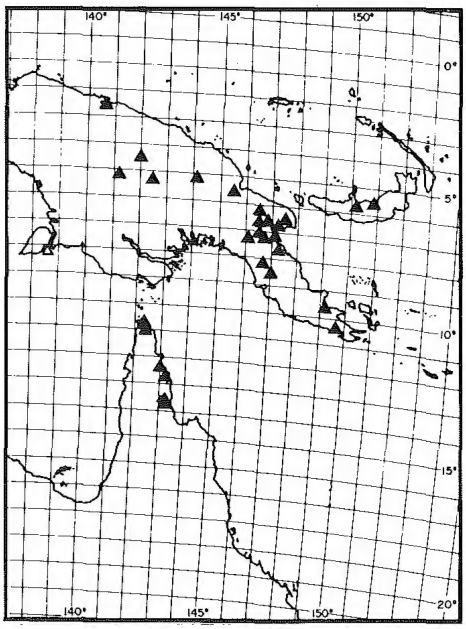

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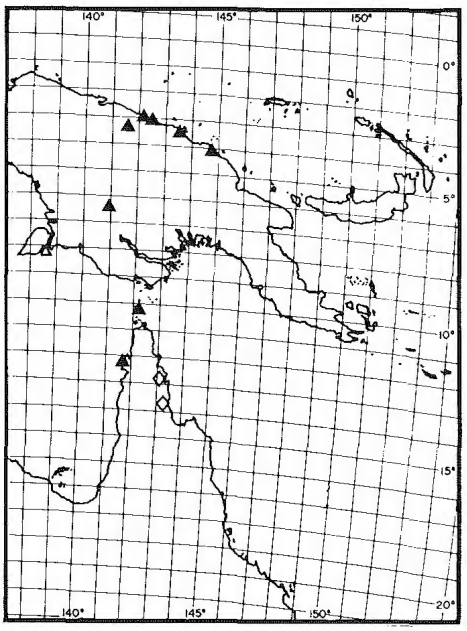

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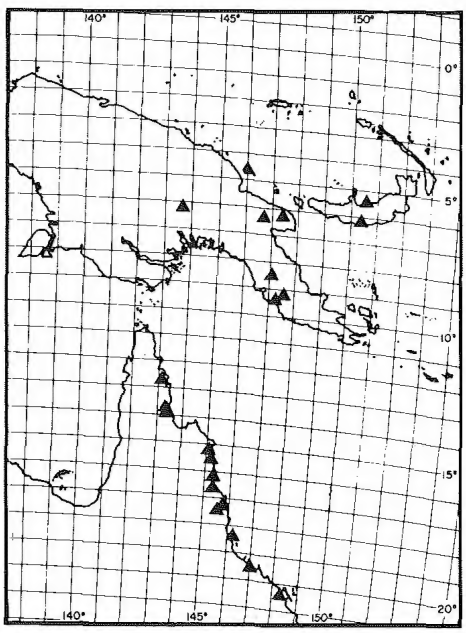

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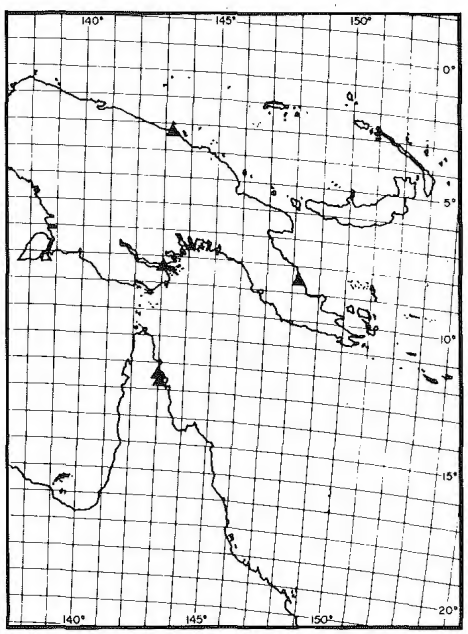

4

Maps 1–4. Distribution within Australia and New Guinea of *Hoya* spp.: 1. *H. lauterbachii*. 2. ▲ *Hoya litoralis*, ◇ *H. macgillivrayi*. 3. *H. nicholsoniae*. 4. *H. pseudolittoralis*.

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The number following the colon is the number of the species in the taxonomic section above.

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